

Anti Icing Success Fuels Expansion of the Program in Idaho

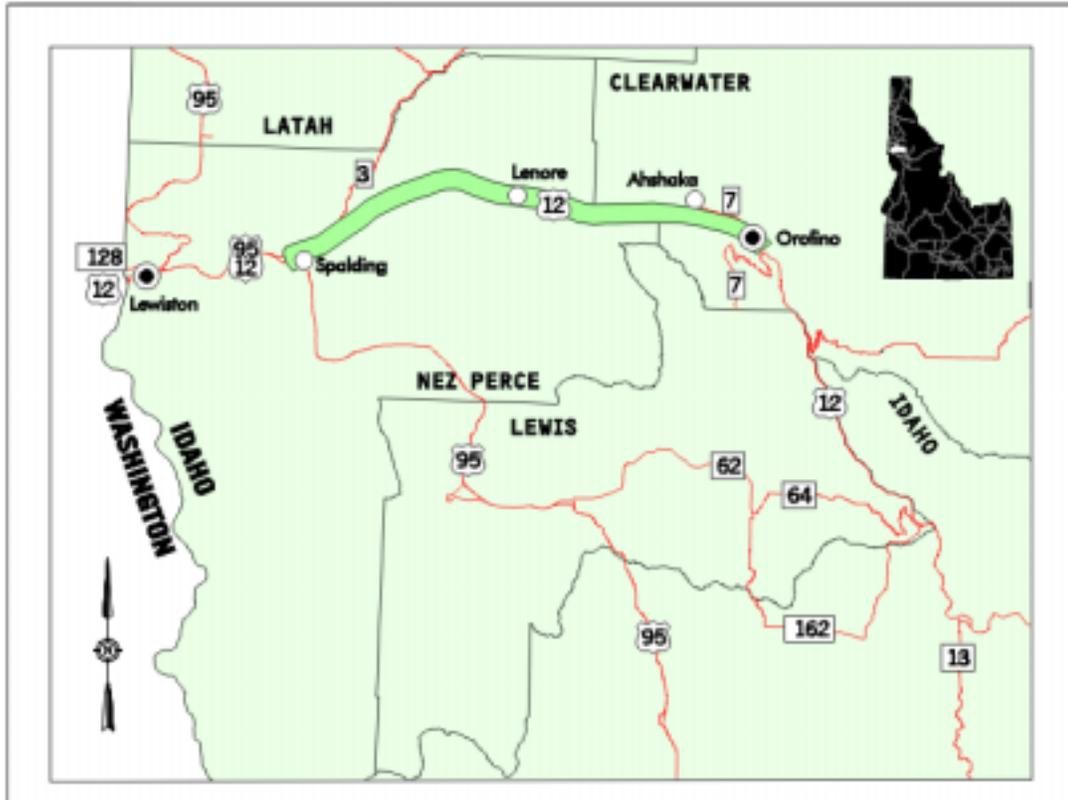
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Winter maintenance on Idaho highways has always been a big challenge for Idaho Transportation Department (ITD) winter maintenance crews. Idaho's mountainous terrain and climate combine to create all kinds of maintenance challenges in the winter months. The motorists and the snowplow operators face everything from frost and black ice on the roads to severe winter storms that can drop a couple of feet of snow over night. To meet the challenges of maintaining the highways in Idaho in winter the ITD maintenance crews use all the tools available to them. In recent years, a new tool has been used with great success around the state. That tool is called anti-icing. Anti-icing is a proactive approach to keeping highways clear of snow and ice by applying liquid freeze-point depressant chemicals to the highway ahead of the storm.

ITD has been using liquid magnesium chloride for anti-icing on some state highways for about ten years. In ITD's program, very small amounts of magnesium chloride are sprayed on the road before the snow starts to fall or prior to a forecasted frost event. Subsequent applications are made during large storms to keep the chemical concentration high enough so freezing does not occur on the pavement. In snowstorms the chemical helps keep a bond from forming between the snow and the road. This allows snowplows to clear the road much faster after the storm. Because only small amounts of chemical are used, it will not melt large amounts of frozen precipitation, however, in frost prone areas the chemicals can completely eliminate frost on the road for three or four days per application.

One particular success story for ITD, related to the use of liquid magnesium chloride as an anti-icing agent, is on a section of US Highway 12 (US-12) in the northern part on the state. This section of US-12 was an ideal candidate to benefit from anti-icing applications for several reasons. They include:

- Fairly mild winter temperatures
- Low rain and snow area
- Hazardous road conditions in the winter due to numerous frost episodes
- Moderate traffic flows
- Expensive to maintain with traditional methods



MAP OF AREA WITH SECTION OF US – 12 HIGHLIGHTED IN GREEN

This paper summarizes the successful anti icing program of ITD’s Maintenance crews from the Orofino shed.

US – 12 from Arrow Bridge over the Clearwater River to the city of Orofino (milepost 15 to 44) had always been a challenge for winter maintenance crews due to many factors. US – 12 is a winding highway situated in a deep canyon along the Clearwater River. In the winter, the highway is prone to frost events and black ice formation. The area also receives low to moderate amounts of snow. Due to the sharp curves and many shaded areas where slick conditions can persist for long periods of time, the highway was particularly hazardous to motorists. These conditions also resulted in extremely high quantities of abrasives (crushed 3/8” minus aggregate) being applied by the crews to try to mitigate hazardous conditions. However, abrasives would only temporarily improve traction when applied to frost or black ice. The abrasives tended to be blown to the side of the road by trucks and cars as they traveled the road.

Due to the high number of accidents and the high labor and materials costs to maintain US-12 in the winter, the District 2 Maintenance Engineer, Pat Lightfield, decided to try using liquid chemicals for anti-icing. The anti-icing program on US-12 began in the winter of 1996/97.

Prior to starting the anti-icing program, the crews required training and equipment needed to be purchased or modified for using liquid chemicals. The crews received training on all aspects of anti-icing; when to apply chemical and when not to apply, what chemicals to use and the properties of the chemicals, proper application rates for different conditions, how to track their results using a TAPER log to learn from their experience, and how to operate the equipment.

The district modified existing equipment to get the program started. The equipment currently being used is a 1985 International S1700 truck, previously used as a weed spray truck with a 1500-gallon tank and a 1989 Ford L8000 truck with a 1000-gallon tank. Both units are equipped with Raven Spray Controls. The district has also installed two 6900-gallon tanks for storage at the Orofino yard. The storage facility is equipped with an electric pump that is used for circulating the chemical and for loading the trucks.



ANTI-ICING EQUIPMENT USED ON US – 12



MAGNESIUM CHLORIDE TANKS AT THE OROFINO MAINTENANCE YARD

In the wintertime, the Orofino Foreman Area operates with an eight-man crew. All the crew members are trained in anti-icing procedures. The main triggers for applying magnesium chloride are forecasted storms or frost events. An important part of proactive anti-icing is access to real-time pavement and weather conditions. Typically Road Weather Information System (RWIS) roadside weather observation sites are used for the real-time weather data. However, currently there are no RWIS sites in the area for the crews to use. Although RWIS are planned for the area, currently the crews rely on the Internet to obtain area weather forecasts. The crews pre-treat ahead of the storm or frost event, typically applying about 20 to 30 gallons per lane mile. But application rates can vary from around 10 gallons to 50 gallons per lane mile depending on the forecasted weather event. A single application has remained effective for up to seven days for frost events. The length of effectiveness is highly dependent on the amount of precipitation, humidity and pavement temperature; but typically stays effective for frost for about 3 to 4 days.

Because the crews do not have RWIS to provide data on the chemical concentration on the road, they have developed their own set of indicators that enable them to retreat the road before the chemical concentration drops too low to be effective. The crews do regular checks of four indicator areas along the highway. When they see frost on the

shoulder of the road starting to migrate back into the travel way, they know it is time for another application.

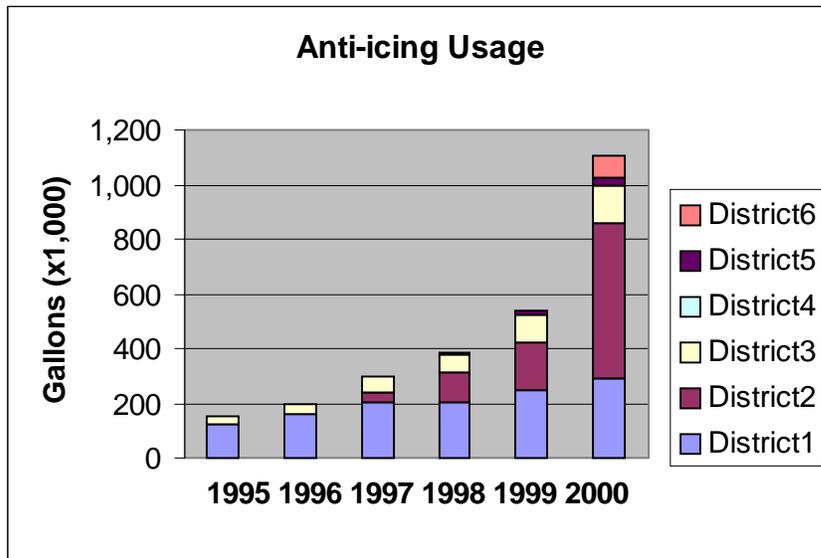


US – 12 AFTER ANTI-ICING TREATMENT SHOWING FROST ON EDGE OF ROADWAY

The anti-icing program on US-12 has been a tremendous success. Since beginning the anti-icing program the district has reduced labor hours and the amount of abrasives applied to the highway. Wintertime accidents have also been reduced. Because labor hours, materials used and wintertime accidents are all very dependent on the severity of the winter, it takes several years of data to determine trends in winter maintenance costs. Therefore, yearly averages of labor hours, abrasives used and slick road accidents for the five years prior to the start of the anti-icing program were calculated. These numbers were then compared to the yearly averages for the last three years of data (anti-icing period). The results of the comparison are:

	<u>Ave. Labor Hours</u>	<u>Ave. Abrasives Used</u>	<u>Ave. Accidents</u>
Before 1997	650	1475 cu. M	16.2
After 1997	248	247 cu. M	2.7
Amount Reduced	402	1228 cu. M	13.5
Percent Reduction	62%	83%	83%

Based on the success that the crews had on US-12, District 2 has expanded their anti-icing program to other highways in the district. In the winter of 1999/2000, District 2 used 567,000 gallons of magnesium chloride throughout the district. Successful pilot programs in other ITD districts have also fueled expansion of anti-icing throughout the state. The chart below shows how the use of magnesium chloride has increased in each district over the last six years.



ITD is currently in the process of installing new storage facilities and purchasing additional distribution equipment in order to expand anti-icing to other areas around the state.

